

CLAIMS

1. A wavelength multiplex transmission system having a transmission apparatus and a receiving apparatus connected via an optical transmission line, wherein:

the transmission apparatus is configured to convert differential signals to optical signals to transmit to the optical transmission line; and

10 the receiving apparatus is configured to receive the optical signals from the optical transmission line to reproduce the differential signals.

2. The wavelength multiplex transmission system according to claim 1, wherein the receiving apparatus further combines the reproduced differential signals.

3. The wavelength multiplex transmission system according to claim 1 or 2, wherein the receiving apparatus adjusts a time difference between the reproduced differential signals.

4. A wavelength multiplex transmission system having a transmission apparatus and a receiving apparatus connected via an optical transmission line, wherein:

the transmission apparatus comprises;
5 (N+M) optical transmitters (where N is an integer
of 2 or more and M is an integer from 1 to N) for
transmitting input signals as optical signals with
different wavelengths,

M differential dividers for differentially
dividing M input signals out of the input signals,
respectively, and inputting the differentially
divided signals into $2 \times M$ optical transmitters out
10 of the (N+M) optical transmitters, respectively, and

a wavelength multiplex filter for wavelength
multiplexing and outputting the (N+M) optical signals
from the (N+M) optical transmitters, and wherein:

15 the receiving apparatus comprises;
a wavelength separation filter for separating
the wavelength multiplexed optical signals to output
(N+M) optical signals;

20 (N+M) optical receivers for receiving the (N+M)
optical signals from the wavelength separation filter,
respectively, to output output signals; and

M differential combiners, each differentially
combining the output signals from the two optical
receivers receiving a pair of optical signals which
have been differentially divided and transmitted,
25 out of the (N+M) optical receivers, to output one
signal.

5. The wavelength multiplex transmission system according to claim 4, wherein the transmission apparatus inputs two corresponding signals from one differential divider into two optical transmitters, 5 respectively, and transmits them as optical signals with adjacent wavelengths.

6. The wavelength multiplex transmission system according to claim 4 or 5, wherein the receiving 10 apparatus is further provided with a delay time controller for adjusting delay time difference between a pair of optical signals on the optical transmission line, at the preceding stage of the differential combiner.

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7. A transmission apparatus for transmitting optical signals, comprising:

optical conversion means for converting differential signals to optical signals; and
20 optical transmission means for transmitting the converted optical signals.

8. The transmission apparatus according to claim 7, wherein:

25 the optical conversion means converts the differential signals to optical signals with different wavelengths; and

the optical transmission means multiplexes the optical signals with different wavelengths to transmit.

5 9. The transmission apparatus according to claim 7 or 8, further comprising differential divider means for dividing an input signal to the differential signals.

10 10. A transmission apparatus comprising:

(N+M) optical transmitters (where N is an integer of 2 or more and M is an integer from 1 to N) for transmitting input signals as optical signals with different wavelengths;

15 M differential dividers for differentially dividing M input signals out of the input signals, respectively, and inputting the differentially divided signals into 2×M optical transmitters out of the (N+M) optical transmitters, respectively; and

20 a wavelength multiplex filter for wavelength multiplexing the (N+M) optical signals from the (N+M) optical transmitters to output.

11. The transmission apparatus according to claim 25 10, inputting two corresponding signals from one differential divider into two optical transmitters,

respectively, and transmitting them as optical signals with adjacent wavelengths.

12. A receiving apparatus for receiving optical
5 signals including differential signals, comprising:
optical receiving means for receiving the optical
signals; and
optical conversion means for reproducing the
differential signals from the optical signals.

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13. The receiving apparatus according to claim 12,
wherein:

the differential signals are
wavelength-multiplexed as optical signals with
15 different wavelengths; and
the optical conversion means reproduces the
differential signals from the optical signals with
different wavelengths.

20 14. The receiving apparatus according to claim 12
or 13, further comprising differential combining
means for combining the reproduced differential
signals.

25 15. The receiving apparatus according to claim 14,
further comprising time difference control means for

adjusting time difference between the reproduced differential signals.

16. A receiving apparatus comprising:

- 5 a wavelength separation filter for separating a wavelength multiplexed optical signal to output $(N+M)$ optical signals (where N is an integer of 2 or more and M is an integer from 1 to N);
10 $(N+M)$ optical receivers for receiving the $(N+M)$ optical signals from the wavelength separation filter, respectively, to output output signals; and
15 M differential combiners for differentially combining the output signals from two optical receivers receiving a pair of optical signals out of the $(N+M)$ optical receivers, to output one signal.

- 17. The receiving apparatus according to claim 16, further comprising a delay time controller for adjusting delay time difference between the pair of 20 two optical signals on the optical transmission line, at the preceding stage of the differential combiner.